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EFFECT OF POWDER SYNTHESIS ON CRYSTAL AND MICROSTRUCTURE $BaTiO_3$

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Barium titanate ($BaTiO_3$) has been used in many applications such as multilayer capacitors, piezoelectric ceramics, transducer devices, PTC resistor and has become one of the most important ferroelectric ceramics. It is used extensively in ceramic capacitors, due to its high dielectric constant and low loss characteristics.

Barium titanate was prepared by two methods, polymeric organometallic precursors process and mechanochemicaly. X ray and SEM were used for caracterization of powders and sintered samples. In both ways of synthesis the formation of cubic phase is obtained. It can be observed that in the case of Pechini process $BaTiO_3$ powder is well crystallized but in the case of mechanochemistry process, significant amount of amorphous phase was detected. The sintered samples at 1300°C for 2h, prepared by Pechini process, shows the formation of tetragonal phase. The morphology of the powders consists of particles and its agglomerates, their dimensions depend of the synthesis method. The powder prepared mechanochemicaly posses more anglomerates. The particles are bigger and with iregular shape. Average particle size is about 100 nm and 250 nm for Pechini and mechanochemical process, respectively. In sintered samples, prepared by Pechini process, at 1300°C for 2h is observed two types of domain configuration. The wall thickness ranges from 0.08 μm up to 0.14 μm and from 0.14 μm up to 0.17 μm for 90° and 180° domains respectably. The domain width is around 0.20 μm for both types of domains.

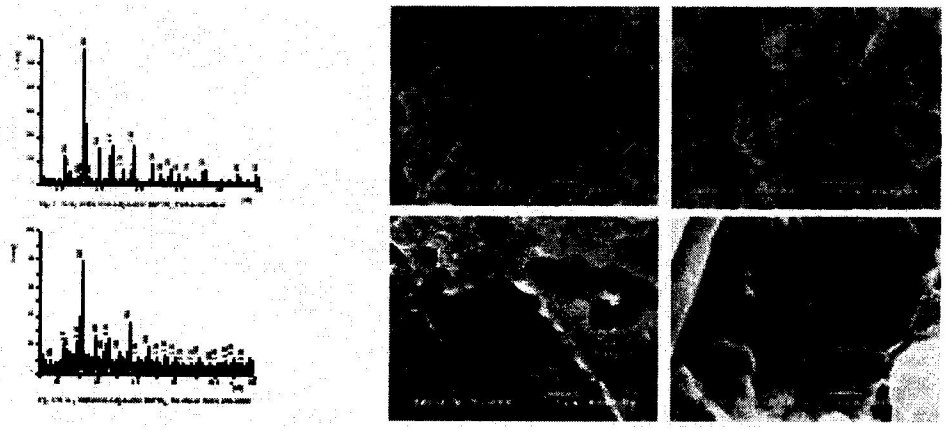

Figure 1. X ray difraction of $BaTiO_3$ powderes obtained by Pechini proces and mechanochemicaly and SEM photographs of both powders and domain structure of sintered samples by Pechini process.

References

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